Wrocław University of Technology

Conceptual project of biomass fired district heating power plant

Sylwia Zawojak
Monika Żurawska
Przemysław Czopek
Bartosz Dziwak
Mateusz Nowak

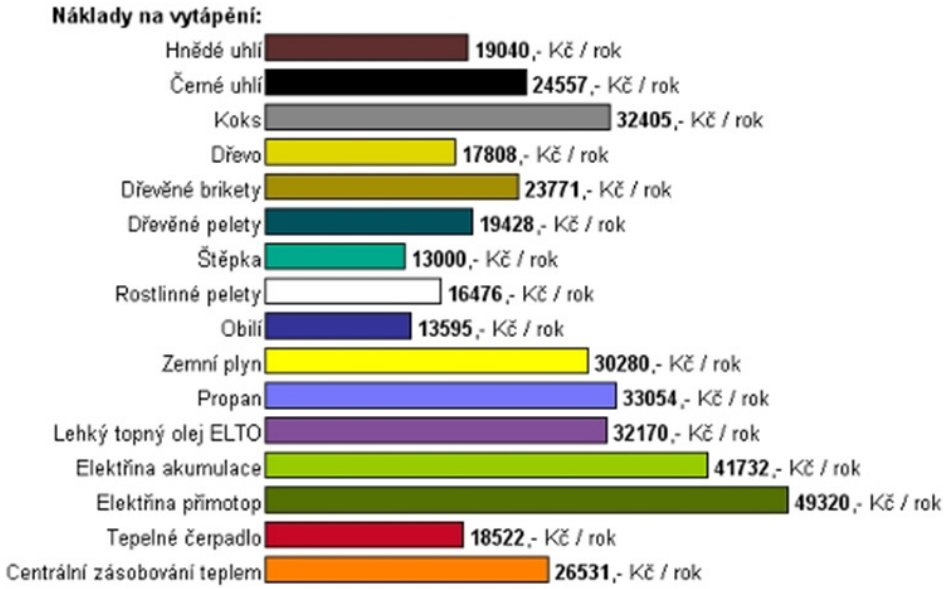
Wrocław University of Technology

Fundamental assumptions

- Thermal power output: **3MW**
- Fuel type: **wood chips**

Wrocław University of Technology

Fuel comparing



Wrocław University of Technology

Characteristic of the fuel

length	5-50 mm
bulk density	232kg/m3
calorofic value	13 MJ/kg
maximal humidity	40 %
ash	0,6-1,5 %

Wrocław University of Technology

Heating load duration curve

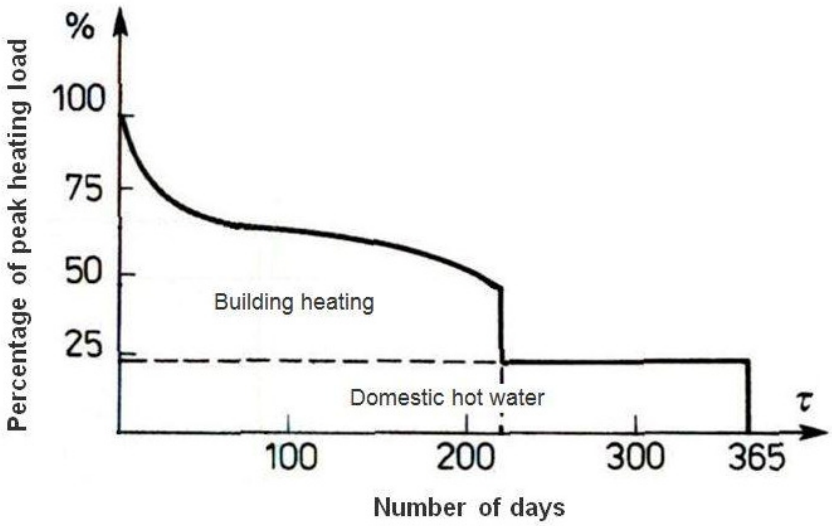


Fig. 1. Heating load duration curve

Wrocław University of Technology

Domestic hot water

- 0,7 MW

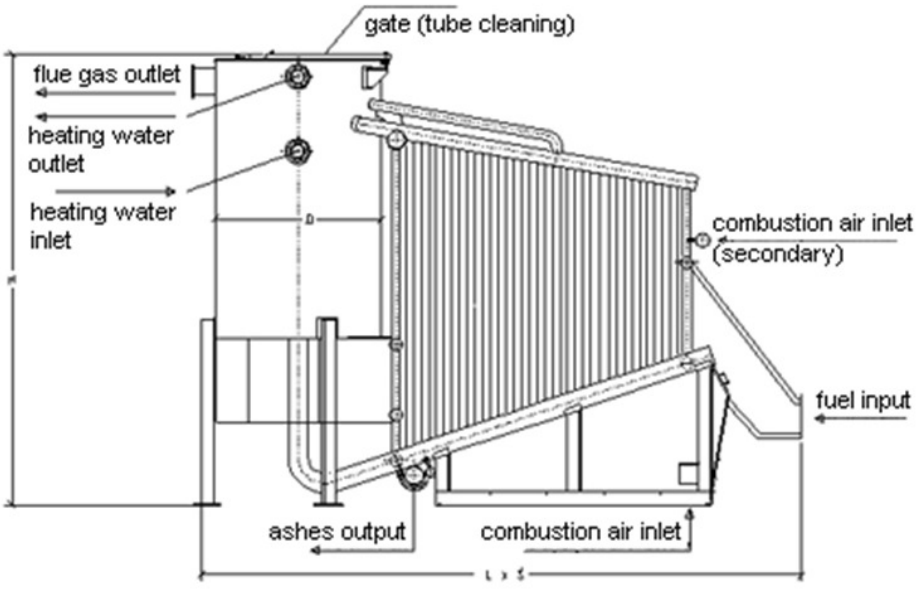
Wrocław University of Technology

Building heating

	I	II	III
Output power, MW	3	2,5	1
Days	25	195	145

Wrocław University of Technology

Choose of the boiler



Wrocław University of Technology

Choose of the boiler

Wrocław University of Technology

Choose of the boiler

Boiler capacity	kW	600	1000	1500	2000	2500	3000	4000	5000
Max. temperature	°C	110							
Max. working pressure	bar	6,0							
Boiler efficiency at nominal output	%	86 - 90							
Outlet flue gas temperature	°C	165							
Fuel demand*	$kg.h^{-1}$	260	433	650	866	1083	1300	1732	2166
Flue gas quantity*	$Nm^3.h^{-1}$	1404	2341	3511	4682	5852	7022	9364	11704
Boiler lenght	m	4,9	5,4	5,8	6,2	6,5	6,8	7,2	7,6
Boiler width	m	2,1	2,1	2,1	2,1	2,5	2,5	3,0	3,0
Boiler height	m	4,5	4,5	4,7	5,1	5,4	5,7	6,1	6,5
Boiler weight	m	12400	13200	14000	14800	16500	18400	20900	24100
Water volume in boiler	m^3	3,60	4,75	5,85	7,10	9,30	10,90	14,50	19,40

*at nominal capacity, wood chip material humidity 40 %, and clean heat-delivery surfaces.

http://www.steptrutnov.cz/en/manufacturing-programme/boilers-for-biomass/boilesr-for-burning-wood-chips-and-grains-step-kb-600-5000-kW.htm

Wrocław University of Technology

Choose of the boiler

I - STEP - KB 1000 kW

II - STEP - KB 2500 kW

Boilers are produced by

Wrocław University of Technology

Fuel demand

$$B = \frac{Q_B}{Q_w^r} \cdot 3600 \cdot 24$$

B – fuel demand, $^{ton}/_{day}$
Q_B - heat flow delivered to the boiler, MW
Q_w^r - calorific value, $^{MJ}/_{kg}$

K = 95-100 $^{euro}/_{ton}$
K – fuel price

	I	II	III
Output power, MW	3	2,5	1
Fuel demand, $^{ton}/_{h}$	0,97	0,69	0,28
Fuel demand, $^{ton}/_{period}$	581,71	3240,9	964,25
Fuel price, $^{euro}/_{year}$		454751,7 ÷ 502725,3	

Wrocław University of Technology

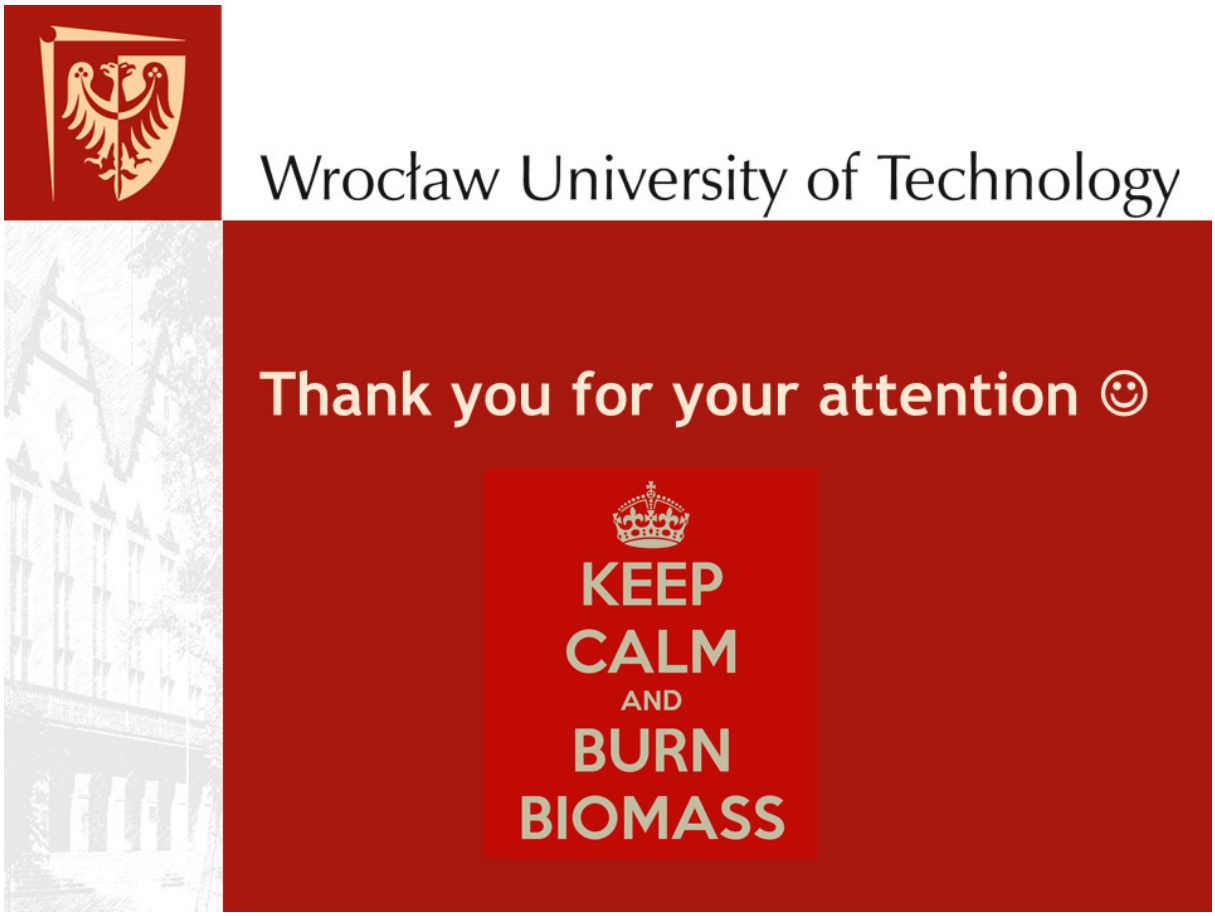
Visit us in Wrocław - the most beautiful city in Poland!

WROCLAW 2016
European Capital of Culture

Wrocław the meeting place

Wrocław University of Technology

And so on... ;)


Wrocław University of Technology
Thank you for your attention ☺
KEEP
CALM
AND
BURN
BIOMASS